LINDERNIA BRUCEI, A NEW WEST INDIAN SPECIES OF THE ASIAN SECTION TITTMANNIA

RICHARD A. HOWARD

IN 1950 I COLLECTED an unusual herbaceous plant while making general collections on a fragment of an old volcano above the Soufrière on the island of St. Vincent in the Lesser Antilles. The specimen appeared to be a member of the Gesneriaceae and was sent to the late C. V. Morton, who stated that it was a new genus but that the material was inadequate for description. Subsequently, botanists visiting St. Vincent were asked to seek that plant, but no one was able to locate the population. In March of 1971 I returned to St. Vincent again and made several attempts to find the plant, but without success. Although the ascent of the Soufrière volcano to the edge of the crater at 3300 feet is relatively easy, the Soma to the north of the present crater lake and the dry crater of the 1912 eruption must be climbed by the only directly ascending ridge, which I had used previously. With the frequent cloud cover, this approach to the Soma is not always visible.

In November of 1971 the crater lake of the Soufrière was observed in an agitated condition. The lake level had begun to rise, gases were being emitted, and the temperature was considerably elevated. It was apparent that the volcano was in a stage preliminary to an eruption. Eventually a cinder cone was formed from the bottom of the crater, exceeding the elevated water level by nearly 600 feet (W. P. Aspinall, H. Sigurdsson, & J. B. Shepherd, Science **181**: 117–124. 1973).

When word of this potential eruption was received, a trip was planned to photograph the vegetation around the crater in the event that an eruption occurred or lava or cinders overflowed the rim and destroyed the vegetation, as had happened in the past. (See bibliography *in* R. A. Howard, Volcanism and vegetation in the Lesser Antilles, Jour. Arnold Arb. **43**: 279–311. 1962). It also seemed that this might be a last chance to locate and collect additional material of the undescribed "new genus." On this trip in February, 1972, the summit was again cloud-covered, a condition possibly accentuated by the heat of the volcanic ejecta and the 80° C water of the crater lake. The field work was exciting at the time and remains so in retrospect. Although the summit of the Soma was obscured by clouds and visibility was limited, on our final trip occasional strong winds lifted the clouds and permitted some safe progress over the cinder slopes and crevasses. By early afternoon we had approached the Soma cliff. It was apparent that we would not see the upper levels of any of the ridges, for although they were directly in front of us, they ended in clouds. After we had climbed a bit on several

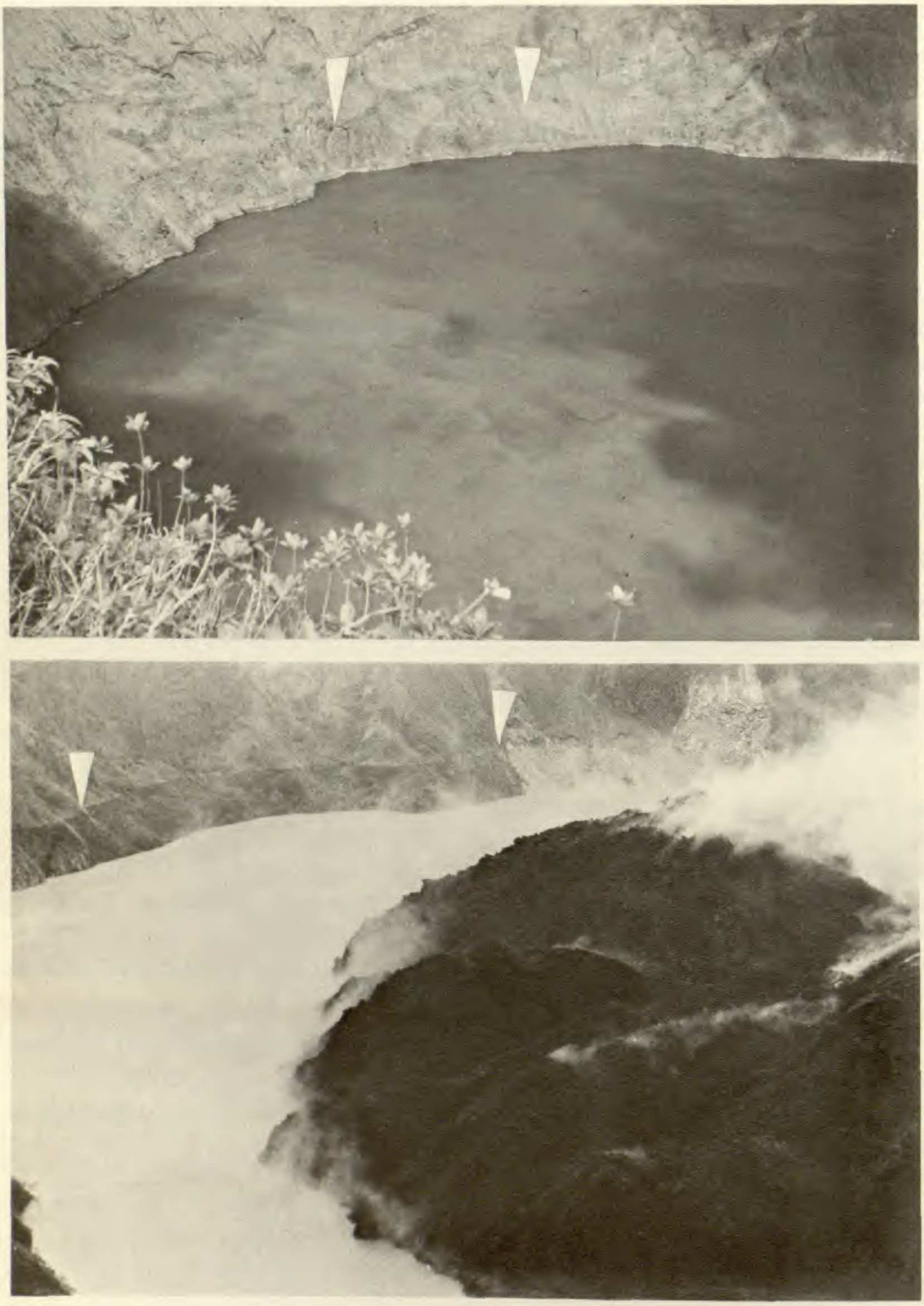

FIGURE 1. Above: Soufrière crater in February, 1971. Foreground vegetation is *Baccharis pedunculata* and *Freziera undulata*. Photo taken with a 50 m. lens. Below: Soufrière crater in February, 1972, while mound of ejecta was still increasing. Photo taken with a wide-angle lens. Arrows in the two pictures mark comparable positions; in the lower photograph, points of arrows mark the upper limit of hot water damage to the vegetation.

of the ridges, however, fortune favored us and the plant we sought was finally relocated. Field observations were made and a sizeable set of specimens was obtained.

Living plants were returned to the Botanic Garden in Kingstown but did not survive at the lower elevation. Specimens returned to the greenhouses of the Arnold Arboretum also progressively declined until, after six months, all were dead. Various methods of maintenance had failed. The plant appeared to be strongly rhizomatous and cuttings of these horizontal stems rooted readily, yet the shoots produced small leaves and failed to elongate. The thick, fleshy, pubescent leaves, reminding one of the leaves of *Saintpaulia* in texture, also proved capable of developing good masses of roots in a propagation bed; however, as they did not develop shoots, eventually these rooted leaves also failed. In retrospect, we can only surmise that the plant may be an annual.

After the death of Dr. Morton, specimens of the new collection were sent to Mr. Hans Weihler, a current student of the Gesneriaceae, who reported that the plant was different from anything known in the family from tropical America. He suggested that this material might be associated with the poorly known genus *Anetanthus* reported from Central America. This suggestion led to the study of the species of *Anetanthus* and the eventual rejection of an association with them. Advice was also sought from Dr. Harold Moore, Dr. B. L. Burtt, and Dr. John Thieret for means of distinguishing between the Gesneriaceae and Scrophulariaceae. Dr. Burtt, in a thoughtful and very helpful consideration of the problem, concluded that the plant was most likely a member of the Scrophulariaceae, and both he and Dr. Thieret suggested an association near *Lindernia* of this family.

The specimen from St. Vincent fits section TITTMANNIA according to the recent monograph of the Malaysian species of *Lindernia* by David Philcox (Kew Bull. 22: 1–72. 1968), who included a key to the sections of the genus in that area. The stamens in our material are four, are associated in pairs, and all bear fertile anthers. The nonparallel anther sacs are divergent and open by slits. In bud both the posterior pair of stamens and the anterior pair are adherent by their anthers. The filaments of the anterior pair are geniculate at the base. The calyx is deeply divided into equal segments to the base. The capsule, clearly superior, is ellipsoidal and shorter than the calyx. The stigma is bilobed.

Although Philcox did not supply a complete list of the species within section TITTMANNIA or geographic ranges, he subsequently stated that all species occur in South East Asia and that all entries in *Index Kewensis* under the name *Tittmannia* are from tropical Asia. The assignment of a West Indian specimen, clearly not an introduced plant, to this section requires serious consideration.

The genus *Tittmannia* Reichenbach (Scrophulariaceae), although long considered synonymous with *Vandellia* L., has been rejected in favor of *Tittmannia* Brongniart (Bruniaceae #3285, ICBN). *Vandellia* L. is considered a synonym of *Lindernia* Allioni by Philcox, who follows Pennell

in this treatment. Thieret did likewise in the treatment of the Scrophulariaceae for the *Flora of Peru* (Field Mus. Bot. 13: 685. 1971), although Standley and Williams, in a later treatment of the family for the *Flora of Guatemala* (Fieldiana Bot. 24: 374. 1973) stated, "We have followed Thieret in placing *Vandellia* L. as a synonym of *Lindernia*, but with misgivings." Yamazaki (Jour. Jap. Bot. 29: 299–305. 1954) recognized both *Lindernia* and *Vandellia* in his treatment of the plants of eastern Asia, with the latter genus including *Tittmannia*. The species of *Vandellia* listed in *Index Kewensis* are all from Asia except *V. diffusa* L. of the New World and *V. racemosa* Sprengel, said to be from Brazil. *Vandellia diffusa* L., currently called *Lindernia diffusa* (L.) Wettst., is clearly distinct from the St. Vincent material. *Vandellia racemosa* Sprengel (Neue Entdeck. 1: 262. 1820) is described as having alternate leaves, and I can find no modern use of this binomial or any description in the many recent floras of Brazil.

A glabrous, fleshy, and quite conspicuous glandular process at the base of the ovary of the St. Vincent material, associated with the fleshy opposite leaves and the adherent anthers, directed my original search for the identity of this material with the Gesneriaceae. Neither Pennell in his many papers nor Philcox in his treatment of the Malaysian species of *Lindernia* nor any other modern floristic treatment has described this basal gland, although Philcox illustrated it indistinctly in his *figures 2–3*, *3–3*, and *4–3* (Kew Bull. 22: 14, 16, 22. 1968). However, the gland was described and illustrated by Yamazaki (Jour. Jap. Bot. 29: 303. 1954), who in *figure 4* showed the variations in this basal glandular process for *Lindernia pyxidaria*, *Vandellia angustifolia*, *V. crustacea*, and *Torrenia violacea*. The St. Vincent material has a gland similar to that illustrated by Yamazaki for *Vandellia angustifolia*, a species Philcox calls *Lindernia anagallis* (Burm. f.) Pennell. I have examined material which Philcox cited and assigned to sect. TITTMANNIA and have found a comparable gland. Other species of other sections examined at random do show variation in the shape of the gland, so that it is possible that a character of taxonomic value may exist in the basal gland. The St. Vincent material appears to conform to the limits of the genus *Lindernia* and does not represent a new genus.

The copious pubescence of simple unicellular hairs present on all parts of this *Lindernia* from St. Vincent is distinct from the multicellular uniseriate hairs of *Anetanthus* and other genera of the Gesneriaceae. Comparable hairs are found on specimens of *Lindernia viscosa*, *L. montana*, and *L. stemodioides* cited by Philcox.

The following description of the pollen grains and the photograph (FIGURE 2) were supplied by Dr. Umesh Banerjee: pollen grains prolate, tricolpate, colpi long tapering, membrane in the colpus region consisting of warty structure, no well defined pores present, exine reticulate, thickness 1.0 μm. Superficially, the pollen grains resemble those of *Anetanthus* and *Goyazia* of the Gesneriaceae and are unlike those of *Stemodia peduncularis* Benth. of the Scrophulariaceae (Howard, Jour. Arnold Arb.

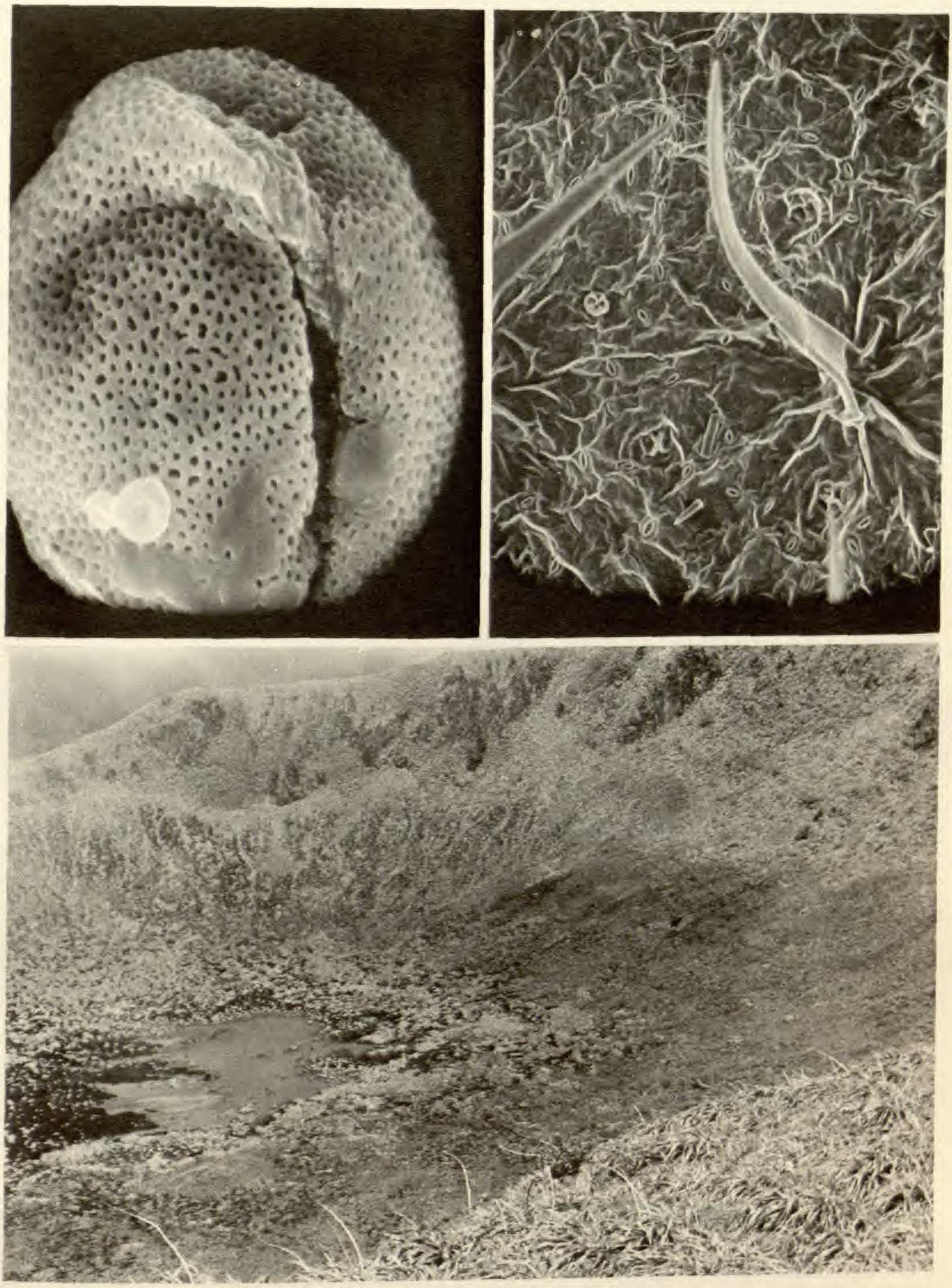

FIGURE 2. Above (left): **Lindernia brucei,** pollen grain, × 5,000. Above (right): **L. brucei,** SEM photograph of unicellular hair and a reticulated pattern of the epidermis, × 150. Below: "Dry Crater" from the 1812 eruption north of the Soufrière crater lake. Foreground vegetation is mostly *Lobelia* spp. and *Pitcairnia* spp. Slopes of the Soma are visible in the background.

56: 364–368. 1975). I have been unable to find other published SEM photographs of the Scrophulariaceae or Gesneriaceae for further comparison.

Dr. Philcox has examined material of this St. Vincent plant and agrees that the new *Lindernia* should be assigned to sect. TITTMANNIA, for which

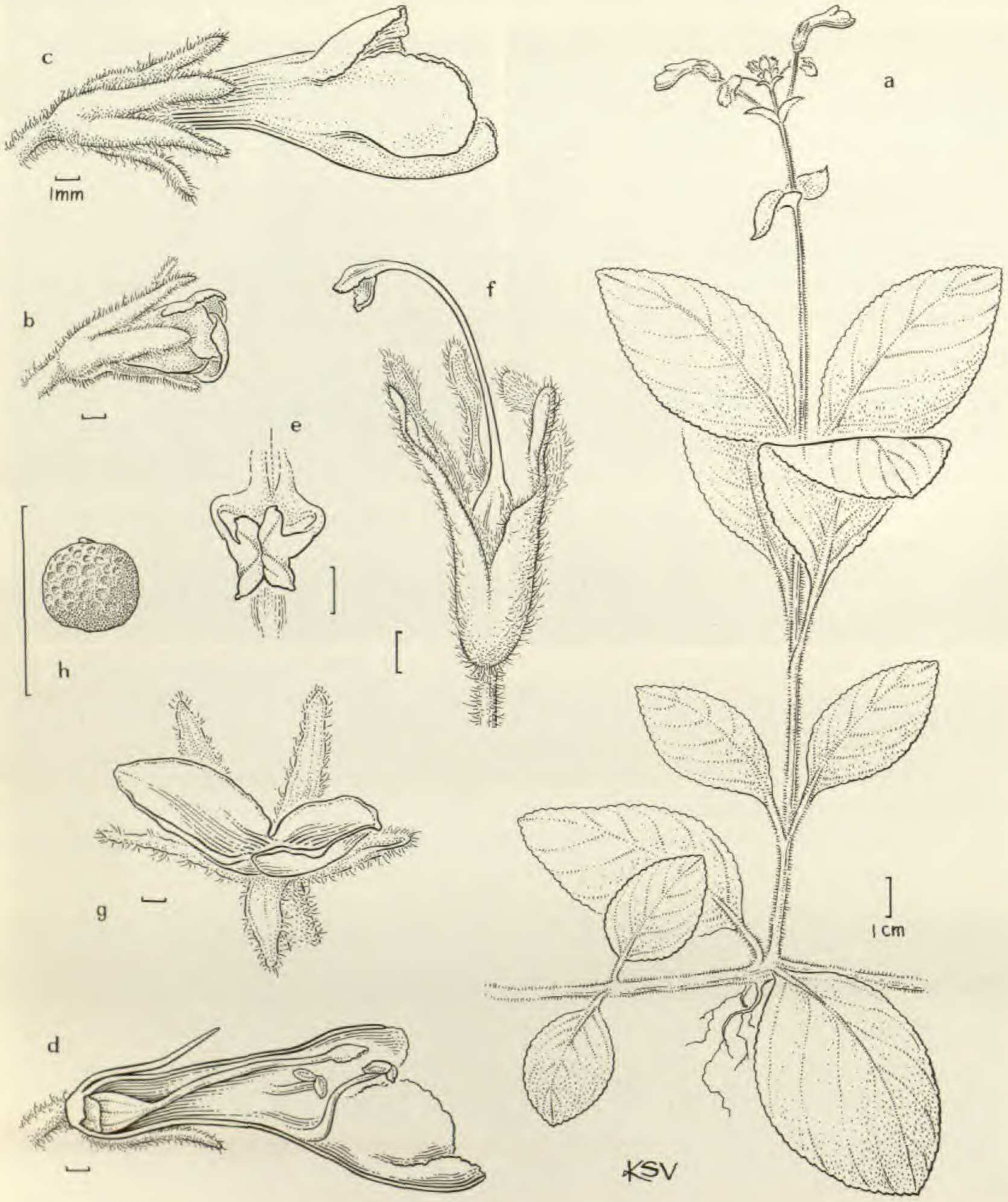

FIGURE 3. **Lindernia brucei** Howard: a, habit; b, flower in bud; c, open flower; d, longitudinal section showing basal ovarian disc and geniculate filament; e, pair of geniculate stamens with fused anthers; f, flower after corolla has fallen, stigmatic lobes flat; g, open fruit; h, reticulate seed.

it comprises a major range extension. He has suggested *L. latifolia* (Bl.) Koord. as the closest related species. I am grateful to the several people cited for their help in this problem.

Lindernia brucei Howard, sp. nov.

Herba, rhizomatibus vel caulibus serpentibus copiose radicantibus, ramis floriferis erectis usque 30 cm. altis. Lamina elliptica vel oblonga,

4 × 2.5 ad 5.5 × 3 cm., apice rotundata vel obtusa, basi rotundata vel cuneata, margine obtuse crenata, nerviis primariis 4–5, utrinque copiose pubescentia, pilis simplicis unicellularibus. Petioli 5–15 mm. longi. Inflorescentia ad medium bibracteata, bracteis ambitu deltoideis, basi truncatis, apice acutis, 1.3 × 1.1 ad 3.5 × 2.5 cm., bracteis floralibus multo deminutis, ovato-deltoideis, 5 × 3.4 mm. Pedicelli ca. 1.5 cm. longi pubescentes. Sepala 5 libera, aequalia, lanceolata 5 × 2.5 mm. longa lataque, extus copiose pubescentia. Corolla purpureo-rosea, tubo 1 cm. longo, in alabastro labio inferiore superiorem includente; labio superiore bifido, lobis rotundatis, 3.0–3.5 mm. labio inferiore majore tripartito, lobis centralis 5.5 × 6.5 mm., lobis lateralis 4.0 × 4.8 mm. Stamina didynama, glabra; filamentis duobus superioribus basi geniculatis, 3 mm. longis, inferioribus rectis 2 mm. longis. Pistillum glabrum, glandula carnosa glabra 0.8 mm. alta dimidio basi ovarii cingente; stylo 1 cm. longo, supra complanato; stigmatibus 2 planis, marginibus erosis; ovario 2 mm. longo, ellipsoideo leviter complanato. Fructus ellipsoideus 2.5 mm. longus, calyce fructifero brevior; seminibus globosis 0.4–0.45 mm. diametro, brunneis, testa reticulata.

DISTRIBUTION. St. Vincent, Lesser Antilles, West Indies. Ridges at the base of the Soma, north of the crater lake on the Soufrière mountain at an altitude of 3600 ft. Flowering in February with flowers and fruit in April.

SPECIMENS EXAMINED. *R. A. Howard 11912* (GH, US); *R. A. & B. R. Howard 18060* (holotype, A), Feb. 26, 1972.

I take pleasure in naming this species for my son, Bruce Howard, a companion on the trip on which I re-collected the material and my assistant in earlier field work on Pico del Oeste in Puerto Rico.

I am grateful to Ms. Karen Velmure and Dr. L. M. Perry for assistance in the preparation of this paper.

ARNOLD ARBORETUM
HARVARD UNIVERSITY
CAMBRIDGE, MASSACHUSETTS 02138